UNIVERSIDAD DEL SALVADOR
Rodríguez Peña 752 - Buenos Aires
Argentina

TECHNOLOGY POLICY AND PLANNING IN LATIN AMERICA

Máximo Halty Carrere

Documento Nº 51

Reproducido de Technology Policy Study Centres in Africa. Report on the IDRC/ECA. Meeting on the Creation of Centres for Technology Policy Studies in Africa, Ile-Ife, Nigeria, 1973, 5-10 diciembre, pág. 23-27.

Technology Policy and Planning in Latin America

Máximo Halty-Carrère

Research Fellow, International Development Research Centre
(formerly head of the Technological Planning and Studies Division,
Organization of American States)

This paper attempts first to clarify what is meant by technology policy and planning in Latin America by providing its conceptual framework. Technical development is a process of production, distribution, consumption, and international trade of a special commodity: technology. The purpose of the technology policy and planning effort is to formulate policies, strategies, and plans to establish a continuous process of technical development within the general framework of economic, social, and cultural development goals of each society. The scope of this field in Latin America is therefore significantly different from that which prevails in developed countries, where science policy was initially a synonym for research policy, and, later, a policy to develop the scientific and technological infrastructure.

A review of what has been done in this field in Latin America stresses the complementarity of the action undertaken at national and regional levels. A Regional Project of Science and Technology Policy and Planning was set up by the Organization of American States, (1) to promote an awareness of the need to formulate national and sub-regional technology policies and plans; (2) to undertake the necessary basic studies required for their formulation; and (3) to provide technical and financial assistance to establish adequate institutional mechanisms for these studies. Since its inception in 1968, almost $2 million was invested in this regional program. A decentralized approach was taken from the beginning in the sense that all studies and research were conducted at the national level by national teams. The Regional Secretariat was given the role of promoting the participation of new national teams, facilitating the exchange of information and experiences through seminars and meetings, and providing the methodological support for a common approach. The program started in two countries and gradually expanded to include most of the countries in the region.

The studies were carried out at two levels. Basic research dealt with the analysis of the factors that affect the global process of technical development, and a study of its components; and applied research prepared the groundwork for the formulation of policies and plans. These studies can be summarized in note form as follows:

Basic Research

(1) the process of production of knowledge (analysis of the industrial research and development effort)

(2) the process of diffusion (analysis of the role of "intermediaries," i.e. information and technical extension services, technical consultants, etc.)

(3) the process of application (analysis of the economic, psycho-sociological, and cultural factors which affect the process of technical change and innovation)

Applied Research

(1) analysis of the scientific and technological system (research and development, information, technical services, etc.) in terms of human, financial, and institutional resources; definition of existing technical capability using the local supply of technology

(2) analysis of the process of international transfer of technology ("visible" and "invisible" costs, restrictive conditions, adaptability of imported technology, etc.) to define the conditions for the supply of foreign technology

(3) analysis of the requirements for science and technology for national development; definition of the potential demand in accordance with national priorities

An analysis of the relative advantages and disadvantages of the various possible institutions to undertake these studies showed that, (1) universities and independent research organizations are better suited to undertake basic research in the field; (2) government agencies must formulate policies and strategies, and implement them; and (3) universities, independent or government research organizations, and government institutions could all be concerned with applied research activities, provided that a strong link with government is established. International organizations should play a promotional, catalytic, and supporting role to facilitate international comparison and exchange of experiences.

A summary of the results achieved in the Latin American region follows.

At the *national* level:

- Institutions for technology policy studies were established and reinforced (e.g., national research councils, national policy councils, royalty commissions, transfer of technology registries, etc.).
- Institutions capable of undertaking sound research work in the field were also established and supported (e.g., universities, independent research organizations, national research councils, planning commissions, etc.).
- A "body of knowledge" about the subject was developed.
- A small but influential group of professionals were trained in the field.
- A first attempt was made to formulate national policies for scientific and technological development.
- A very preliminary attempt was made to implement national policies and plans.

At the *sub-regional* and *regional* levels:

- The Regional Science and Technology Policy and Planning Program was developed by the OAS.

- Common policies, strategies, and regulations for technical development, and for controlling the transfer of technology were formulated and adopted (Andean Pact sub-region).

Evaluation of Technology Policy and Planning Research

An evaluation of the Latin American experience in technology policy and planning research should include an analysis of the successes and failures of both methodology and results.

Methodology

Two methodologies have been developed for research into technology policy and planning: (1) the methodology for compiling inventories of scientific and technological systems (although they do not include the technological capabilities of industry); and (2) the methodology for analyzing the process of importing technology, and the conditions of the international technology market.

There is still no suitable methodology for determining the *demand* for science and technology. The "sectoral" approaches are too expensive and time-consuming, and the "global" approaches proved to be unsatisfactory.

Results

Three criticisms can be levelled:

(1) Too much emphasis has been given to the methodologies for compiling inventories of the science and technology system, without the necessary preliminary effort of defining how to use the information for generating policy measures.

(2) Too much emphasis has been put on the problem of determining the supply, and too little on defining the potential and actual demand.

(3) Too much relative emphasis has been placed on studies required for "micro-planning" of the effort (e.g., inventory studies), compared with studies which could be used directly to define policies and formulate strategies.

However, much of the research (mainly the transfer of technology studies) did have a strong impact at political decision-making levels and did influence the formulation of policies and strategies. Also the research effort gradually built up a "body of knowledge" which placed Latin American work in the forefront of world-wide research in the field. It may be noted that research material prepared for CACTAL (Conference on the Application of Science and Technology for the Development of Latin America, Brasilia, May 1972) and other Latin American conferences has been quoted in many international conferences and seminars.

In only a few years the research effort has created an awareness of the problems faced by Latin America in science and technology.

Evaluation of Science and Technology Policy and Planning

An assessment of the Latin American experience in science and technology policy and planning during the last decade reflects a chronological parallelism between the advances in Latin American thinking on the problem and the accomplishments attained at the national, sub-regional, and regional levels.

Three definite stages can be identified in the progress of the policies adopted in several countries of the region, in groups of countries, and in the region as a whole.

The first stage corresponds to a policy which only concerns itself with reinforcing the scientific and technological infrastructure. When the thinking on science policy was restricted to technical research and education policy, several countries established national research councils to coordinate research and

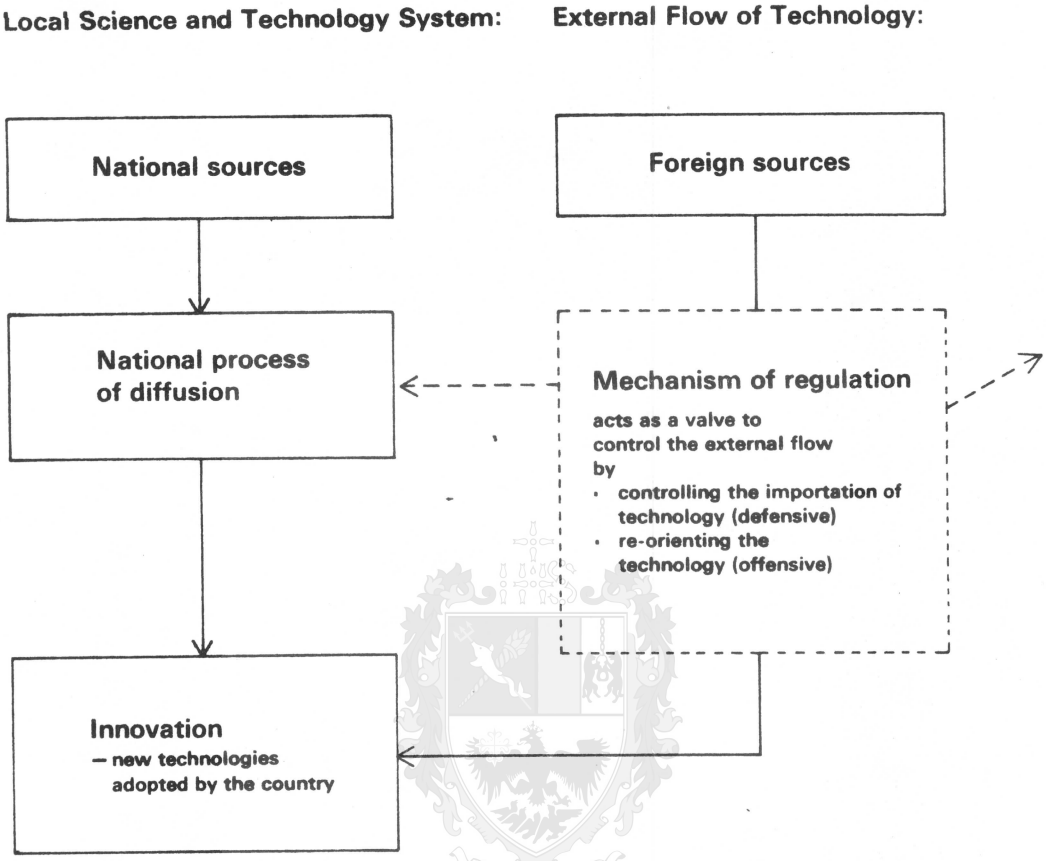

FIG. 1. Chart showing the need for a regulating mechanism to control the bypass of local science and technology policy systems by the flow of external technologies.

promote scientific education. At the regional level, the OAS Regional Program for Science and Technology Development was created to develop and reinforce the technical infrastructure through regional cooperative research and educational projects.

The second stage is a "defensive" strategy which aims to control the flow of external technologies to improve the process of technology importation. This strategy arose from a series of research studies undertaken with support from the OAS Regional Program and the IDRC, in several Latin American countries. These studies called attention to the imperfections of the international market of technology and the various problems developing countries face in importing technology. Among these problems are:

- the explicit and implicit cost of the imported technology;
- the restrictive conditions attached to it;
- the fact that imported technology is often not adapted to local conditions;
- the lack of proper information on, or evaluation of, alternative technologies; and
- the lack of development and utilization of local technologies.

Most of these problems are due to the "bypass" of the *local* science and technology policy system by the flow of *external* technologies (see Fig. 1).

Most countries reacted to this bypass by creating a national control mechanism for regulating the flow of external technology (e.g., registries of licensing arrangements, patents, etc.), and by uniting in the Andean Pact to lay down common defensive regulations.

This third stage could be called an "offensive" strategy. It involves the establishment of a mechanism to regulate the flow of external technologies in order to increase the utilization of local technologies, and encourage their development and gradual export. This approach follows the analysis made at CACTAL of the orientation to be given to technical development in Latin American countries, by trying to overcome the present "marginality" of their scientific and technological systems. The mechanism of regulation acts as a "valve" to control the external flow, thereby increasing the level of technological self-reliance in accordance with national policy and sectoral technical development.

This strategy of dynamic, "offensive" regulation is being applied effectively only in one country, but the Andean Pact countries (Bolivia, Ecuador, Chile, Peru, Colombia, and Venezuela) are now defining a common technological policy along these lines.

The Latin American countries are at various stages in policy development, depending on their present degree of technical advancement. However, their progress generally seems to follow the three levels outlined above to attain the proclaimed objective of reduced technological dependence.

Discussion

■ Several questions and comments centred on the offensive and defensive strategies adopted in some Latin American countries, and the mechanism of control of technology importation. It was first noted that in order, for instance, to be able to follow Japan's offensive strategy of importing technology, modifying it and re-exporting it, countries must have the required technological and organizational infrastructure. It was also felt that as part of any defensive strategy, careful attention should be given to a proper selection of imported equipment and imported technology.

■ Answering a specific request for more information on the measures for control of imported technology, Mr Halty-Carrère gave some examples of how the first institutions established in Latin America (royalty commissions) were controlling and approving licensing arrangements only out of concern for the conservation of foreign currency. A new dimension has gradually been added by requiring them to take into consideration technological policy matters. In other cases, new bodies have been established for mandatory registration of these contracts. Some of these new bodies have tried recently to control the external flow in a way that would ensure that national scientific and technological institutions participate in the process of transfer. In Brazil, for instance, before approving the licensing agreements, the controlling body tries to find out if there is similar technical knowledge in local industry or in the local industrial research system.

■ A comment was made on the advisability of taking a political decision to cut external contracts for the purchase of technologies to encourage technical self-reliance. A policy of isolation would tend to create a climate of hardship which could stimulate the development of local sources of technology.

With respect to this suggestion, it was felt that this policy could be adopted in those sectors where there is an adequate local technological infrastructure. The regulation of the external flow of technology could, in some sectors, follow a policy of self-reliance; in others, the regulation mechanism could follow a policy of relying mostly on foreign technology, while gradually incorporating an increasing share of local technology.